troduction, Levey adequately covers the major types of Arabic literature on pharmacology, although the term is poorly defined in the footnote on page 3. He does better with the etymology and sources of Arabic names in materia medica but gives little attention to the life and times of al-Kindī.

It is, however, refreshing to note that Levey has included a reproduction of the original Arabic manuscript. He has rendered the translation thoughtfully, with good taste, and, for the most part, with meticulous accuracy. In several passages, however, words and sentences are incorrectly translated (see, for example, Nos. 13, 85, and 216 on pp. 42, 100, and 210 to 212, respectively). A few titles of subdivisions, moreover, have been ignored or overlooked—for example, No. 95 on page 108, where a new paragraph should read: "*Dentifrices:* The white dentifrice used to arrest (cure). . . ." No. 99, on page 110, should read: "Another dentifrice for the aforementioned ailment . . ." and No. 102, on page 112, should read: *The Yahūdī's* (*Jewish*) *Dentifrice* not the "Jewish Tooth." This possibly refers to a recipe prepared by Masarjawayh or another Jewish physician of the 8th or 9th century.

The publisher deserves credit for the excellent format, the fine reproduction of the Arabic manuscript, and the beautiful Arabic script included with the materia medica.

Scholars and Arabists interested in the history of Arabic medical sciences and etymology will find this book a welcome addition to any research involving the evolution of Arabic pharmacy and medical therapy.

SAMI K. HAMARNEH
Division of Medical Sciences, Smithsonian Institution

Organic Evolution

Important contributions to evolution in modern times have included numerous original books devoted to technical considerations of one aspect or another of this extremely and increasingly complex field. The names of such authors as Darlington, Dobzhansky, Fisher, Ford, Grant, Haldane, Huxley, Lerner, Mayr, Rensch, Schmalhausen, and Waddington at once rise to mind, and the list is very far from being exhaustive. Nevertheless there has been a dearth, one could almost say absence, of works covering the whole field of modern evolutionary theory briefly, simply, and authoritatively. That need is now filled by **Processes of Organic Evolution** (Prentice-Hall, Englewood Cliffs, N.J., 1966. 191 pp., $2.50) by G. Ledyard Stebbins, who also belongs in the previous list as author of a large technical work on variation and evolution in plants, one of the bases of the current synthetic theory.

As the title indicates, this book is concerned with the "how" of evolution ("What makes evolution go?"), and not with the what ("What has happened in the course of evolution?"), or the why ("What is the meaning of evolution, its transcendental reason, or its philosophical impact?"). It covers the selected field very well, indeed amazingly so for so concise a work. The first chapter outlines the synthetic theory and its origins briefly (it will go without further saying that everything is brief). Variation and variability (nature, sources, and significance) are next considered, first as embodied in organisms and then as itself organized and operative in reproducing populations. Progressive evolution in populations is dealt with, giving special consideration to competition and to the critical points of extreme delicacy and complexity of adaptation and of apparently nonadaptive characteristics.

Speciation is treated in a usefully restricted sense, as the outcome of reproductive isolation. The counterpart of such isolation is hybridization, a special interest of the author, given somewhat more space than would otherwise be expected. Inferences from the fossil record and such long-range phenomena as rates, trends, and emergence of novelty are summarized in the chapter "Major trends in evolution." Finally, human evolution is the exception to the intention not to discuss the course of evolution, but here, too, relevant processes are emphasized.

Each chapter is followed by questions, and the presentation is that of a text. It is otherwise an excellent one, but the material is scanty for a separate course on evolution, and as a textbook this may be most useful for inclusion as a part of a more general introductory biology course. It should also be accessible to honest enquirers outside of schools.

Illustrations are numerous and useful although a few are puzzling or contain misprints. There are also some other indications of careless editing. Many printings should be called for, and revision will be possible. In the meantime, this is an excellent book as it stands and worthily fills a great need.

GEORGE GAYLORD SIMPSON
Museum of Comparative Zoology, Harvard University

International Conference on the Earth Sciences

Advances in Earth Science (M.I.T. Press, Cambridge, Mass., 1966. 516 pp., $20), edited by P. M. Hurley, is a record of the papers presented at the International Conference on the Earth Sciences held on the occasion of the dedication of the Cecil and Ida Green Building at the Massachusetts Institute of Technology in September 1964. The papers are by 15 distinguished authors, one each from Munich, Oslo, Moscow, and Canberra and the other 11 from institutions well distributed in the United States. The subject matter ranges widely across many of the active fields of earth and space science—from solar and interplanetary physics and planetary astronomy (Goldberg, Biermann, and Kuiper); through atmospheric circulation and other meteorological phenomena (Lorenz, Eliassen, and Obukhov); oceanic circulation, waves, and sediments (Stommel, Munk, and Arrhenius); to a group of six papers on the "solid" earth: the figure of the earth as evidence of its mechanical properties, recent advances in seismology, the constitution of the earth's interior (MacDonald, Press, and Ringwood), and heat flow, geochronology, and convection in the upper mantle (Birch, Wasserburg, and Elsasser).

The type of treatment accorded these topics varies almost as widely as the subject matter. A few of the papers are quite technical; two offer no references to the literature of their topics; one or two are original contributions of new knowledge; but many of them are competent to excellent critical reviews of current literature and activities in their fields—reviews that have been written primarily for a nonspecialist audience. In commenting on a book that contains many excellent critical reviews and original contributions, it may seem unmannerly to mention one or two articles individually. Nevertheless, the ar-

ticle by A. E. Ringwood, "The chemical composition and origin of the earth," and the one by Francis Birch, "Earth heat flow measurements in the last decade," are particularly successful in reducing to meaningful dimensions the teeming literature of recent years in these two fields, and it would seem unfair to pass them over without specific compliment.

Users of this expensive, 500-page volume will be disappointed to find that the articles are not provided with abstracts and that the book has no index.

WILLIAM W. RUBEY
Department of Geology and *Institute of Geophysics and Planetary Physics, University of California, Los Angeles*

British Research Establishments

The Organization of Research Establishments (Cambridge University Press, New York, 1965. 281 pp., $11.50), edited by Sir John Cockcroft, is concerned with research in Great Britain. It draws on a wide range of fields, from agriculture through medicine to chemistry, physics, and engineering. To give perspective to the 11 case histories of British laboratories, two additional contributions are included, one on the Bell Telephone Laboratories by its president, J. B. Fisk, and the other on CERN by its former director general, J. B. Adams.

Sir John Cockcroft makes the following statement at the end of his introduction: "The objective of this book is to discuss the factors which make for creativity and productivity in a wide variety of research establishments. We hope that the varying experiences and ideas put forward will be of value to all those who have the responsibility for research."

The average length of each chapter is 19 pages. Because one must describe in some detail the specific aim and subject area of a laboratory in order to bring home to the reader some observations of a more general nature on the promotion of creativity and productivity, the book, in some places, appears to be more a historical account of British research than a handbook for those who seek an answer to a definite organizational problem in a research laboratory. However, most questions do not have a unique answer, and this approach may be a desirable one that will lead the knowledgeable reader to draw his own conclusions from the various cases presented. Great Britain and the United States—two countries where the government spends large amounts of money on research—vary greatly with respect to the channels through which the money is spent. In the United States the larger part is given to private industry in the form of contracts, but the fraction expended in this manner is much smaller in Great Britain. This is reflected in the contents of this book. Of 11 contributions on British laboratories, only one describes industrial research in a private organization, the other ten dealing with government establishments or cooperative research associations. (In the latter the control is in the hands of the relevant industry's trade association and the government's financial share usually is quite modest.) For this reason much space in the book is devoted to the pattern of governing bodies and representative committees needed for the proper executive function at the top. The opinion that, to retain its effectiveness, the organization of a laboratory should not transgress a maximum size is clearly dismissed by the contents of this book. On the other hand the well-known "critical mass" effect for a laboratory is apparently a rather "wild" function of the subject area involved.

The story of CERN, the European Organisation for Nuclear Research, contains a number of very worthwhile observations on the reasons for its success. Many of the later cooperative ventures in Europe seem to foster national chauvinism rather than to abate it. Adams writes that ". . . the danger for CERN lay in the Member States wanting to obtain a share of the contracts and a share of the staff posts in rough proportion to their contributions to the organisation."

The book ends with Sir Edward Bullard's delightful essay "What makes a good research establishment?" Here every director of research will find good counsel and a number of his own experiences, pointedly formulated.

Because the contributors are, without exception, very senior people with extensive experience in the direction of laboratories, the book will be a source of information and inspiration, direct or by comparison, for all those who are responsible for the administration of research.

A. E. PANNENBORG
Philips Research Laboratories, Eindhoven, Netherlands

Marine Biology

Only a decade ago there were just a few references and texts on oceanography and a few more on marine biology. In the last few years we have been overcome with a tsunami of books covering every aspect of the marine sciences. Even formerly obscure areas, such as marine planktonology, are becoming as popular as freshman biology.

Planktonology is rather an anomaly today. Organized systematic studies began in the middle of the 19th century. Mostly taxonomic and distributional in nature, this work existed for its own sake first, and then later as a handmaiden of fishery biology. However, during the past 25 years, there has been a steadily growing interest in the ecology, physiology, and biochemistry of this miscellaneous assemblage of plants, animals, and in-betweens, which are so obviously related to each other and are so important to the marine economy. Today we have an enormous body of long-standing, well-organized, detailed, and extensive knowledge of "what" and "where," and another, largely unrelated but enormous body of recent, disorganized, conflicting, patchy, and intensive knowledge of "how" and "why."

The latest contribution attempting to combine and relate the old and the new work in some rational, general framework, is R. S. Wimpenny's **The Plankton of the Sea** (Elsevier, New York, 1966. 426 pp., $16). It is not completely successful.

The author's expressed purpose was to write a popular book, but, as other similar books appeared, Wimpenny shifted his orientation toward students and beginning professionals while attempting to retain a basic usefulness for the educated layman. The resulting unevenness is evident both in details and in the overall plan.

The book consists of 12 chapters, a glossary, a bibliography, figures of organisms, and an index. The style is conversational, informal, and occasionally witty. There are text figures but not nearly enough. This is a major weakness of the book. The author relies on long, complicated verbal explanations when a picture would have been sufficient or would have helped the explication.

One example, and perhaps the worst, is his discussion of the light and dark bottle method using either gas exchange or carbon-14. The explanation